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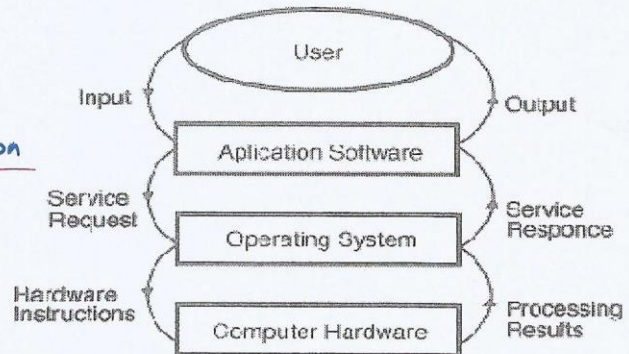
Program execution and error detection are two of the services provided by operating systems. Explain each one of them.

2/4 program execution: the operating system should allow the users to run programs and execute instruction and end. *see rule*

error detection: the operating system should detect errors if they occur and should respond properly to the error and display a message to the user with the information of the error and recover if possible.

The diagram shows computer system components. Explain it?

5/6 users use application software to input data, then the application software make a service request to the OS and the OS communicate with



the computer hardware to execute and process the results, the the computer hardware give the results to the OS, and the OS make a service response to the application software, and the the application software display the processed data to the user



ITCS322/ITCS323 – Operating systems  
First Semester 2013-14  
QUIZ # 2

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Below is a list of OS features needed in different types of operating systems.

1. Memory management
2. On-line file system
3. CPU scheduling
4. Allocation and sharing of devices
5. Communication scheme
6. Mechanism for process synchronization
7. Mechanism for process communication
8. Meeting process deadlines
9. Real-time task should be given priority
10. Sharing of external storage

1. Complete the following table by writing the features that are required by each operating system.

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Simple Batch Systems	Time-Sharing System
1 ✓	1, 2, 3, 4, 6 ✓

2. Which of feature(s) is/are required in hard real-time systems but not in simple/general time sharing systems?
- 1-5/11.5 ✓ 8

3. In which type of systems, Real-time task should be given priority over normal tasks?

2/2 ✓ soft real-time system

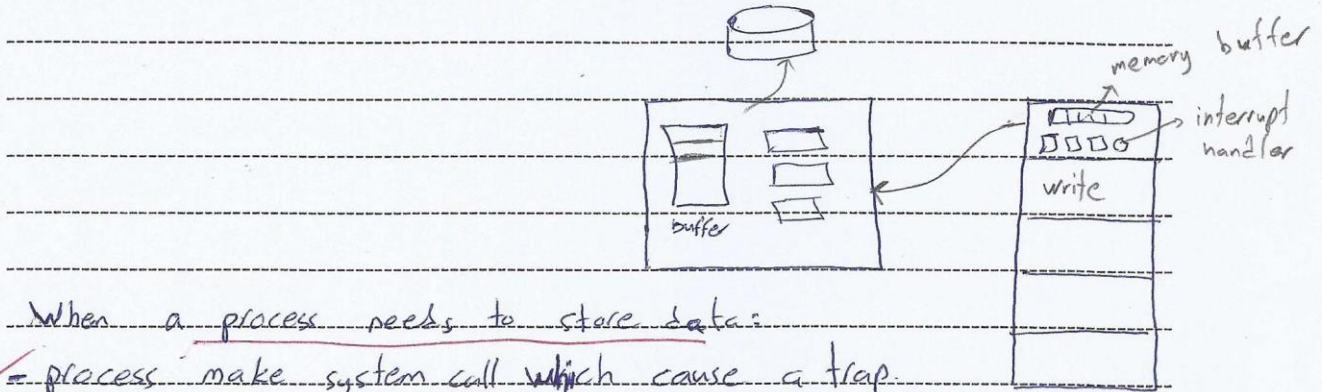
4. Which of the feature is specifically required in clustered systems?

2/2 ✓ 10 ✓

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Q1. Write the steps required to store data on a disk.



When a process needs to store data:

- process make system call which cause a trap.
- CPU execute the interrupt handler for that trap.
- interrupt handler function move the data from memory buffer to the disk buffer.
- disk controller save the data to the disk from the disk buffer.

what else who does  
what? how?  
Sequence

Q2. What is a trap? Write THREE conditions that can generate a trap.

It is a software-generated interrupt that is caused by an error.

- arithmetic overflow/underflow
- dividing by zero
- executing illegal instruction



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Q1. What is busy wait? How do we know whether an algorithm has a busy wait or not?

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busy wait is when a process use the CPU uselessly. for example when we use "while (turn != 0);" the process will keep executing that line until the value change, so it is a waste of CPU time. in code

We know if an algorithm has a busy wait if there a line of code which will execute infinitely until the value change (depends on other values). for example "while (turn != 0);"

Q2. Prove that the following algorithm satisfies the mutual exclusion condition.

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Process  $p_i$

```
:  
DisableInterrupt();  
Critical_section;  
EnableInterrupt();
```

let say that there are two processes ( $P_1, P_2$ ). if process  $P_1$  executes first, the before it enters its critical section, it will disable all interrupts, this means that it will execute its critical section without any interrupts. And when it finish its critical section, it will enable all interrupts again. So when a timer interrupt occurs and the CS switch to process  $P_2$ ,  $P_1$  has already finished its critical section. So there will be no two processes in their critical section in the same time, which satisfies the mutual exclusion condition.



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How the logical address (s,d) is translated to physical address in segmentation technique?  
Explain with one example.

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The logical address is translated to physical address according to the values in the segmentation table. First, we look at the segment number (s) to find the base physical address, then we add the offset (d), which should be less than the limit value.

Ex:

	base	limit
0	5000	500
1	8000	1000

segment table

logical address (0, 50)

$$\therefore \text{physical address} = 5000 + 50 \\ = 5050$$

What is external fragmentation?

External fragmentation is when there is more than one hole (free memory) in the memory which are separated by one process or more.

